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REMARKS

ON

CONGENITAL AND OTHER ABNORMALITIES

OF THE

SKELETON OF THE UPPER EXTREMITY.



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CONGENITAL AND OTHER ABNORMALITIES  
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SKELETON OF THE UPPER EXTREMITY.

BY  
ALEXANDER MACALISTER, L.R.C.S.I., L.K.Q.C.P.I.;  
DEMONSTRATOR OF ANATOMY, ROYAL COLLEGE OF SURGEONS;  
ASSISTANT-SURGEON TO THE ADELAIDE HOSPITAL;  
ONE OF THE HONORARY SECRETARIES OF THE ROYAL GEOLOGICAL SOCIETY OF IRELAND.

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THE occasional varieties found in the component parts of the upper extremity in man are invested with a very great degree of interest when we take into consideration the many forms in which that appendage is developed in each of the vertebrate classes—mammals, birds, reptiles, or fish, as in accordance with the observation of Meckel, human anomalies always, or, at least generally, agree with the regular arrangement of parts in lower animals; and though the bony structures are less liable to exhibit these adventitious gradations of form than are the other and softer tissues, yet we do find in the human upper limb, and that not very seldom, departures from the usual dispositions of these parts. One of these, the supra-condyloid process of the humerus, has been carefully investigated and thoroughly described by Professor Struthers\* of Aberdeen, and others, have been noticed by various anatomists, though few with such minuteness and accuracy. A good many of these abnormalities, unconnected with disease or accident, have come under my notice in the dissecting-room of the Royal

\* Struthers' Anatomical and Physiological Observations, Edinburgh, p. 3-202

College of Surgeons, and these I have made the basis of the following remarks, on the most interesting and important deviations in arrangement of the skeleton of the upper limbs.

Of the scapula, besides slighter variations in shape and size in gibbosity or straightness of outline, I have found a few interesting peculiarities. An exaggeration of development in the tubercle of Retzius, I have twice seen occurring to an extent resembling the normal state in the elephant, or not unlike the prominent spur in many non-clavicate rodents. A wide spur often exists at the origin of the teres major, projecting outwards from the axillary costa. The posterior bodies is frequently convex in males, but usually is straight or concave from the post-spinal triangle to the inferior angle in females. The inferior angular epiphysis I have twice found in very old subjects, unconsolidated with the body and connected by an intervening plate of cartilage.

The conversion of the supra-scapular notch into an osseous foramen is a variety commonly met with; obviously the result of the ossification of the ligament which normally bridges it over; to this the nerve and artery usually retain their normal relations. Humphry\* has recorded an instance in which this osseous foramen co-existed with a perfect notch, but does not relate the position of the vessels and nerve with regard to it. The complete obliteration of the notch, associated with a straight superior costa, I have seen exemplified in a small but strongly-marked scapula from the celebrated cave Uamh-Fraing, in the Island of Eigg. In several other instances of this kind, examined in a recent state, the supra-scapular ligament was either completely undeveloped or else arose by a wide triangular expansion from the middle of the superior costa,

\* Humphry on the Human Skeleton, p. 367.

and was inserted into the root of the coracoid process. One of these instances, in which the notch was obliterated had two separate fibrous bands, one over the other; beneath the lower passed the supra-scapular nerve, and under the upper ran the corresponding artery.

The presence of a detached piece of bone of a triangular, quadrilateral or ovate outline, intercalated between the acromial end of the clavicle and the spine of the scapula, I have ascertained in a good many instances. In general this was symmetrically developed on both sides and in one shoulder joint, a subject of chronic rheumatic arthritis, this formed the roof of the glenoid cavity, and was eburnated on its under surface, to correspond with the polished porcellaneous deposit on the humeral head underneath. The occasional existence of this separate fragment was noticed by Sömmering\* and Meckel.† Its nature is easily understood, as it arises from a want of osseous union, sometimes between the terminal and basal ossific nuclei of the acromion, or more commonly between the basal nucleus and the spine, as in order of time the two acromial centres usually coalesce before they unite with the spine of the scapula. In the former case the intercalary segment is narrow, and somewhat quadrilateral, in the latter it is broad and triangular. Usually the normal acromio-clavicular articulation is perfect between the detached fragment and the clavicle, while the former is united to the scapular spine by a layer of cartilage, or according to Humphry, by a fibrous tissue. Weber,‡ however, has recorded, that he saw one example in which the separated portion of the acromion articulated by a

\* De Corp, Human, Fabric, vol. i., p. 317.

† Manuel d'Anatomie, tome i., p. 705.

‡ Encyclopedie Anatomique, tome ii., p. 132.



regular capsular ligament with the spine of the scapula, and thus led to a very marked increase in the freedom of motion in this situation. A rarer malformation consists in the arrest of development either in the centre of the supra-spinous or infra-spinous fossæ, more frequently the latter, causing an irregular small deficiency, closed by membrane, or else a permanently cartilaginous posterior border may remain, as we find in some ruminants and pachyderms. The former condition, as far as I can ascertain from examination, appears to arise from a central arrest of development in the course of ossification, although Humphry\* has given it as his opinion that it is the result of an excessive degree of that modelling absorption, by which the centre of the blade is thinned as its edges thicken.

Complete deficiency of the scapula has been reported in some fetuses without upper extremities, but even when the arms are wanting the scapula is often present, and Otto has found the glenoid cavity in these cases to be replaced by a tubercle. An instance is reported by Höchstadter,† in which this bone was cleft. The glenoid cavity I have found to present many varieties, in size, concavity, and direction, in the presence or development of the subscapular groove for the tendon of that muscle, also in the nature of the margins of that groove very often there is no trace of it. The inferior glenoidal crest for the origin of the long head of the triceps extensor is likewise variable. I have seen it as prominent as its homotype, the anterior inferior spine of the ilium, in the lower limb.

Of irregularities in development of the clavicle I have seen few worthy of note. Varieties of curve, lateral want of symmetry, irregularities of length, &c., are extremely common.

\* Humphreys, loc. cit., p. 367.

† Höchstadter De Spina Binda. Altdorf, 1703.



I have noticed a vertical curve with its concavity directed downwards, and most frequently met with in females, and nearer to the sternal than to the acromial end. A facet for articulation with the cartilage of the first rib, near its sternal extremity, is not unfrequently seen, reminding us of the state of this bone in the megatherium, where it apparently was united to the cartilage of the first rib, and fell short of the sternum. In cases where this facet exists a regular synovial membrane is interposed, and a slight capsule frequently present, either a modification of the costo-coracoid ligament or a distinct structure—the former I have seen more frequently. It is much more rare to find a facet on the under surface of the outer third, where it rests upon the coracoid process. This condition I have never seen, but it is described by Knox.\* A spur occasionally exists in place of the usual slight conoid tubercle, this is but an exaggeration of the normal appearance, and I have known an osseous epiphysary crust to exist in many instances, on the acromial as well as the sternal extremity of the bone. This is described by Cloquet and Harrison as invariable, but it is unnoticed by Gray and other writers. The existence of a medullary canal has been the subject of difference of opinion. Cloquet mentions the presence of such as only met with in extreme old age, while Todd describes a cylindrical canal as

\* Cloquet's Anatomy, translated by Knox, p. 126. Since this was first published I have met with an interesting example of this arrangement in which there was a distinct synovial sac interposed between the bones, and a partial capsular ligament, the modified remains of the conoid and trapezoid fasciculi. Richet, in his *Traité Pratique D'Anatomie Medico-Chirurgicale*, p. 859, has mentioned, with reference to this, that while the synovial membrane is often present upon the upper surface of the coracoid process it does not invariably reach the clavicle which is not always encrusted here with cartilage. Knox says—and, I believe, incorrectly—that the coraco-clavicular ligaments are probably wanting in these cases.

constantly to be seen ; and Gray states that the shaft, as well as the extremities, consists of cancellous tissue, invested with a compact layer much thicker in the centre than at either end. In general, I have found it impossible to demonstrate the existence of a definite canal with an endosteal lining, although there are always large and communicating interspaces in the central loose cancellous tissue of the bone. Once or twice, however, I have made out distinctly the existence of this space, as a distinct canal, in middle-aged subjects. Complete absence of the clavicles has been found in monsters, in whom the upper extremities were absent. Cases of this kind are recorded by Otto;\* and Henkel† has seen this anomaly even when the upper extremities were developed. A curious variety has been recorded by Martin,‡ in which the acromial extremity of this bone was deficient, and a thin expanded process of the acromion scapulæ took its place. Prochaska§ has mentioned a somewhat similar case, in which the place of the absent portion of bone was supplied by a ligament; and Otto|| has related some instances in which the sternal extremity was suppressed. On the subject of this bone we have an admirable memoir by Professor Struthers, to which I would refer for further information concerning it.

Of the long bones of the limb there are few varieties on record, and still fewer have come within the range of my observation. The supra-condyloid process and ligament so carefully described by Prof. Struthers (*loc. cit. antea*), I have seen six times, always symmetrical in cases where the two arms

\* Otto, Pathological Anatomy, p. 217.

† Henkel, Neue Bemerkung, 1st, Sammlung, p. 60.

‡ Roux, Journal de Medecin, tome 23, p. 458.

§ Prochaska, Disquisitiones, Anat. Physiol. Organ, tab. 8.

|| Otto loc. cit., p. 217.

were submitted to my examination. I have also seen it several times in detached bones, and varying considerably in length; from this spur the ligament was traceable to the inner condyle, and the median nerve and brachial artery passed beneath it; its co-existence with a high bifurcation of the brachial artery has been already noticed, and every information respecting it is to be obtained from the author above quoted.

A perforation between the coronoid and the olecranal fossæ of the humerus, as in some of the quadrumana and carnivora, I have also seen, and this Meckel describes as more frequent in Papuans and Negroes than in Europeans. My friend Dr. Gavin of Boston, U.S., has informed me that he has seen it existing in a large number of the humeri of North American Indians, dug up in an ancient camp on Long Island, a fact likewise noticed and described by Dr. Jackson of Boston. A similar perforation I noticed in the humerus of the celebrated murderer Burke, in the Edinburgh University Museum, but as I did not examine the bone I could not say whether it had been natural or adventitious. Otto has recorded a case of absence of the bicipital groove, of which I have seen two instances. Rokitansky\* mentions the complete deficiency of this bone. A case of this kind is mentioned likewise by Dumeril,† in which the hand articulated directly with the scapula. In another example, when the forearm was absent, this bone became thin at its lower end and ended in two processes.‡ Flachsland§ reports another instance of malforma-

\* Rokitansky, *Path. Anat.*, vol. iii., p. 269.

† Dumeril, *Bulletin de la Société Philomath*, vol. iii., p. 122.

‡ Bonn. *Thesis de oss. Morb. Hov.* Amsterdam, 1783, p. 120.

§ Flachsland, *Observ. Anatomic Pathol.* Rastad, 1800, p. 44, and Hesselbach *Beschreib. der path. præparat, zu Wirburg*, p. 13, Nos. 71, 72.

tion, in which the hand was directly articulated to the lower end of the humerus, the forearm bones being abortive, and a similar case is referred to by Palletta.\* In some cases of congenital luxations the capitulum is described as being either deficient or rudimentary.

Other varieties of the humerus are those of individual size and development: In some a strongly-marked deltoidal crest, and a deeply chiselled musculo-spinal groove exist; in others it is a matter of difficulty to assign the exact limits to these portions. In some bones the coraco-brachial crest is immediately above the nutritious foramen, in others the aperture is on a plane anterior to the insertion of that muscle. These are, however, but inconsiderable and individual appearances.

Of the radius, cases have been described of complete or partial deficiency. When the former state occurs Weidemann† remarks that the thumb and its carpal and metacarpal bones are also wanting. Cruveilhier has related an example of deficiency of the lower half of the bone. Mr. Adams, in Todd's Cyclopædia, has described and figured an instance of congenital luxation of the elbow, in which the tubercle of this bone rests in the lesser sigmoid cavity of the ulna, and the neck is prolonged backwards twice its natural length; in fact, to the level of the summit of the olecranon, the grooves in the lower end may vary. I have once seen an additional one for the extensor medii digiti, while those for the extensor ossis metacarpi and primi internodii pollicis may be double, as also may be the sulcus for the radial extensors of the carpus, long and short.

\* *Exercitationes Pathologicæ*, 1, p. 139.

† Isenflamm and Rosenmüller's *Beiträge zur Zergliederungskunst*, vol. 1, part 6, p. 42.



Complete deficiency of the ulna is likewise recorded, together with suppression of the radius—or in cases where that bone existed,\* but more interesting anomalies are mentioned in relation to it. Chenal† has described the existence of a bony nodule in the tendon of the triceps situated above the point of the olecranon. This is similar to the arrangement in the Surinam toad or *Pipa Americana*, where such a tubercle normally exists; a similar instance is referred to by Rosenmüller,‡ and, if we take the patella as the homotype of the olecranon, this may remind us of the second patella in the ostrich. A corresponding sesamoid development has been described by Sömmering§ as existing in the tendon of the brachialis anticus, above the coronoid process of this bone.

The carpal bones I have found to be the seat of many varieties in number, size, and articulations. I have at present an interesting group of nine bones removed from a large hand in the dissecting-room during the past session; of these the scaphoid exhibits the signs of chronic arthritic disease, and has an extremely small radial facet, a sharp rough tubercle, and a deep hollow for the magnum, with acute margins. The lunar bone has but a shallow concavity for the magnum, a rough facet for the cuneiform, and an eburnated surface for the unciform; it also is modified slightly by chronic rheumatic arthritis; the pisiform is quite typical; the cuneiform is large and irregular, having its normal three facets; the trapezium is very large, with a prominent spur for the external lateral ligament, and a prominent and broad facet for the second meta-

\* Rokitansky, *Pathol. Anat.*, vol. iii., p. 264.

† *Observ. Botan. Medic. Basil*, 1765, p. 4-928.

‡ *Dissert. de sing. et rar. oss. variet.* p. 62.

§ *De Fabric Corp. Human*, vol. i., p. 327.

carpal bone. The os magnum, very wide from before backwards, has on its lower end but two facets nearly equal in size, one for the second, the other for the third metacarpal; the head is smaller proportionally than natural, and is to a considerable extent eburnated. The trapezoid is perfectly normal, and the unciform exhibits a very small porcellaneous surface where it rests on the lunar bone; the supplementary bone is of a triangular shape, and is placed on the back and upper part of the head of the magnum between it and the scaphoid; it has one small and three large surfaces, one somewhat quadrilateral, which articulates with the radius entering into the wrist-joint, another rough and cancellous, which was joined to the lunar, a third for the scaphoid, and a fourth very small for the os magnum.

Examples of this additional bone have been recorded by Otto, Sandifort, and others. Meckel has described a ninth bone between the cuneiform and the os magnum.\* Dr. Smith,† in his work on "Fractures and Dislocations," records an example in which the lunar bone was divided into two parts.

Among animals we find in the carpus of the ouranguoutang an intermediate bone described by Vrolik‡ as placed between the scaphoid, lunar, magnum, trapezium and trapezoid; this ossicle, however, does not correspond to the example given above, but is evidently of a different type. It is remarked by Vrolik that it is undeveloped in the carpus of the chimpanzee, but well-marked in that of the ourang. An instance of diminution of number in these bones is recorded by Jourdain§ in a

\* Meckel, Handbuch der Anatomie, vol. i., p. 220.

† Smith, Fractures and Dislocations, p. 252.

‡ Recherches d'Anatomic Comparée sur le Chimpanze.

§ Encyclopédie Anatomique, vol. ii., p. 139.

carpus of a negro in the museum of the Jardin des Plantes, with seven bones, the lunar and cuneiform being fused in both hands, and a similar instance is described by Heusinger.\* Cruveilhier gives a case in which the trapezium was confounded with the trapezoid and scaphoid. The variations in the number of articular facets are not uncommon. The lunar and unciform, which generally meet, may not unfrequently be separated, and I have seen five articular facets on the trapezoid bone; in fact, minute differences in configuration may be detected in at least one out of every three series of carpal bones. In other animals they are also liable to vary. Otto quotes an instance in which the carpas of a horse consisted of ten instead of six bones, and others would doubtless be found, if sought for carefully. Deficiency of the trapezium and scaphoid has been described in some instances of abortive radius, and the pisiform has, I believe, been absent in some few instances.

In cases of the not uncommon anomaly of six fingers a supernumerary metacarpal may exist.† I have seen this in the hand of a living man of about forty years of age, where it existed on the ulnar side of both hands, and was probably articulated to the unciform bone, but was much shorter than any of the normal metacarpals. Occasionally the metacarpal of the thumb has been absent, and more rarely that of the middle finger. Coalescence of the second and third metacarpal I found in a large male hand in which there were no signs of inflammatory action.

Variations of the phalanges have been described by deficiency, or perhaps coalescence, the second and third being fused

\* Heusinger *Zeitschrift für Physiologie*, vol iii., p. 330.

† Salzmann, *Dec. Observat. Anatom.* Argentor, 1725. p. 3.



together, more particularly in the little finger. I have seen this more commonly in the toes, but have only met with one example in the hand. A still rarer case is recorded by Columbus,\* where a supernumerary phalanx existed in the fingers—rare, because except in cetacea and birds the number of phalanges rarely exceeds three; in the former group, however, they sometimes amount to five, six, seven, or even more, and in the latter vary from one to five. Varieties of the phalanges in length, thickness, or obliquity, are not uncommon, but amount only to individual variations.

\* Columbus, *De Re Anatomica*, p. 485.

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